

SECTION 3

IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

3.1 INTRODUCTION

This section provides a detailed description of the alternatives considered for this non-time critical removal action. Components or technologies common to the removal action alternatives are described in paragraph 3.2. An identification of the alternatives is presented in paragraph 3.3. A screening and analysis of the alternatives is conducted in paragraph 3.5 to determine if any of them may be removed from consideration prior to performing a comparative analysis.

3.2 ALTERNATIVE COMPONENTS OR TECHNOLOGIES

3.2.1 No technologies are used in the implementation of Alternative 1 – No Further Action. Components of Alternative 2 – Land Use Controls, include any restriction or control arising from the need to protect human health and the environment that limits the use of and/or exposure to, environmentally contaminated media (e.g., soils, surface water, groundwater, air) or environmental hazards at any site at Fort McClellan. LUCs may include controls on access (e.g., engineered such as fences and non-engineered such as security guards) as well as mechanisms for ensuring compliance with necessary land use limitations (e.g., public advisories, legal restrictions on land or water usage). Additionally, the term encompasses both affirmative measures to achieve the desired control (e.g., night lighting of an area) and prohibitive directives (e.g., no drilling of drinking water wells). Specific Land Use Controls that are appropriate for the M2 Parcel are education of site workers in hazards associated with OE and appropriate actions to be taken (i.e., notifications). Alternative 3 – Construction Support and Alternative 4 – Surface and Subsurface Clearance of OE use the following common components:

- Brush/grass clearance/surface survey,

OE Detection,
OE Excavation, and
OE Detonation.

3.2.2 Brush/Grass Clearance/Surface Survey. If required, brush and tall grass will be cleared using mechanical equipment and/or hand-held tools. The level of effort will vary over the site, depending on the density of growth and terrain. Prior to beginning brush clearing and surveying activities, UXO qualified personnel will perform a visual surface sweep to ensure that no OE items that may pose a safety hazard exist on the surface. The UXO personnel may use geophysical instruments to locate OE depending on the density of the vegetation. The surface will be surveyed and a grid system put in place.

3.2.3 OE Detection. A survey to locate surface and potential sub-surface OE items will be performed. The survey will employ one or more technologies to remotely detect metallic bodies in the soil. Technologies that could be employed include magnetometer and electromagnetic (EM) detection. The selection of the best technology depends on the properties of the OE to be located, including whether the ordnance is found on the surface or below the surface, and the characteristics of the location where the OE is located, such as topography, vegetation, and geology.

3.2.4 OE Excavation. During a subsurface clearance operation, buried OE or suspected OE identified by the geophysical survey or other detection methods requires excavation for removal. After an exclusion zone is established, the excavation of the OE item then takes place with either hand tools or mechanical equipment depending on the suspected depth of the object. Once the OE item is exposed, it is then inspected, identified, and transported to a designated area for cataloging and eventual disposal. If it is determined during the OE inspection that the item cannot be safely moved, then it may be necessary to destroy the OE item in place.

3.2.5 OE Detonation. Recovered OE items confirmed or suspected to have an explosive hazard will be destroyed by detonation. All detonation activities will be performed in accordance with a UXO Operational Plan approved by the USAESCH. Disposal of recovered OE can take one of three different forms: off-site demolition and disposal; remote, on-site demolition and disposal; and in-place demolition and disposal. The decision regarding which of these techniques to use is

based on the risk involved in employing the disposal option, as determined by the specific area's characteristics and the nature of the OE item recovered.

If transported off-site for destruction, the OE would be transported by either Army personnel or by a qualified UXO contractor. The transportation of OE is performed in accordance with the provisions of 49 CFR 100-199 and applicable state and local laws. A Transportation Plan detailing the route and procedures used during the transportation is prepared and approved prior to engaging in any off-site OE transport to ensure all safety aspects of the movement have been addressed. It is not anticipated that off-site transportation of OE for destruction will be necessary during this removal action.

If OE is recovered in close proximity to occupied buildings it may not be possible to safely destroy the OE item in place. In this instance, if the item is deemed safe to move, the OE item can be moved to a remote part of the project site where demolition and disposal can safely take place. Engineering controls, such as sandbag mounds and sandbag walls over and around the OE item, are often used to minimize the blast effects when an OE item is destroyed in this manner.

Finally, an OE item may be destroyed in place. This technique is typically employed when the OE item cannot be safely moved to a remote location or if the OE items are located in an area that is sufficiently remote. When this technique is employed, engineering controls such as sandbag mounds and sandbag walls over and around the OE item are often used to minimize the blast effects.

3.3 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

3.3.1 The removal action for the M2 Parcel is limited to the removal of OE from the ground surface and subsurface. Since the purpose of this removal action is for OE removal only, the number of alternatives evaluated was limited in number. The Army considered a total of four removal action alternatives during initial screening. The No Further Action alternative was considered in order to confirm that a removal action must be taken.

The alternatives considered in this EE/CA are:

- Alternative 1 – No Further Action
- Alternative 2 – Land Use Controls
- Alternative 3 – Construction Support
- Alternative 4 – Surface & Subsurface Clearance to Depth with LUCs

Alternative 1 – No Further Action. This alternative requires no action at the site. Recommendation of this alternative may leave undiscovered OE in the environment that poses an undetermined risk to the public. This alternative would not remove any ordnance contamination from the site, nor would it impose any land use controls (discussed below).

Alternative 2 – Land Use Controls. This alternative as a stand-alone remedy could consist of various public awareness components including printed media, an ad-hoc committee, classroom education, visual media, and exhibits/displays, as well as policy modifications by subsequent owners and deed notices. This alternative does not include the removal of OE.

3.3.3 *Alternative 3 – Construction Support.* Alternative 3 would entail providing surface and subsurface clearance of OE in support of planned construction activities. The clearance would be limited to areas where intrusive activities are necessary to complete construction. Clearance activities would not be scheduled until a construction design was available. UXO qualified personnel would use metal detection devices to ensure that any OE items that may exist above or below the ground surface in areas where intrusive construction activities were planned were detected. Any OE located during the sweep would be inspected to ensure its stability and disposed of in accordance with the approved detailed work plan.

Alternative 4 – Surface & Subsurface Clearance of OE to Depth with LUCs .
Alternative 4 includes the surface and subsurface clearance of OE items to depth with LUCs. Any land use controls will be delineated in a Land Use Control Implementation Plan (LUCIP). LUCs in the form of site specific OE education and handouts may be part of these land use controls. Also, land surveying and brush clearing operations would be necessary. Alternative 4

could be conducted using either of two different technology approaches that have been proven in large field scale applications under similar conditions for detection:

- Hand-held magnetometers “mag and flag”
- Digital geophysical mapping

3.3.5 Hand-held Magnetometers. During the removal action, a hand-held metal detection device capable of performing both the surface sweep and the subsurface survey will be used to locate surface and potential subsurface OE. All subsurface anomalies would be flagged to identify their location. Intrusive investigations would be conducted at each suspect anomaly location until the anomaly is identified. All OE identified would be disposed of in accordance with the approved detailed work plan. This technology is capable of detecting the potential OE at this site at the depths at which it is anticipated to be encountered. This approach would minimize the amount of brush clearing needed as well as expedite the reacquisition of each anomaly. However, this approach does not provide a digital output which could identify potential data gaps or allow for greater discrimination ability to minimize the amount of investigation of anomalies required.

3.3.6 Digital Geophysical Mapping. During the removal action phase, the entire site would be geophysically surveyed using a proven technology to detect and identify, through digital output, the location of subsurface anomalies. The geophysical data would be analyzed to identify anomalies that could potentially be OE. These anomalies would then be relocated and intrusive investigations would be conducted to identify the anomaly. All OE identified would be disposed of in accordance with the approved detailed work plan. This technology is capable of detecting the potential OE at this site at the depths at which it is anticipated to be encountered. This approach would require more brush clearing needed as well as additional time to analyze the data and reacquire each anomaly. However, this approach does provide a digital output which could identify potential data gaps or allow for greater discrimination ability to minimize the amount of investigation of anomalies required.

3.4 ANALYSIS OF REMOVAL ACTION ALTERNATIVES

3.4.1 Criteria for Initial Screening

Four removal action alternatives were addressed in the initial screening. Each potentially applicable alternative was screened for fundamental characteristics that could eliminate it from further consideration. This screening was performed by directly utilizing procedures and criteria set forth in USEPA documents for preparation of an EE/CA (EPA 1993). The initial screening of alternatives used the following screening factors:

- Effectiveness – (Overall protectiveness to public health and the environment and (2) the ability of the alternative to achieve removal action objectives.
- Implementability – (1) The technical feasibility of the alternative, (2) the ability of the alternative to produce the desired results with an acceptable schedule, and (3) the acceptability of the alternative to local, state and federal institutions and administrations.
- Cost – The general range of each alternative's technology.

3.4.2 The purpose of the screening was to eliminate technologies with obvious "fatal flaws" up front, so they would not have to be carried through the detailed analysis. The scoring process is included in Table 3.1. The summary of the initial screening results is included in Table 3.2. From this initial screening the two highest rated alternatives (3,4) were selected for detailed screening along with Alternative 1 – No Further Action.

TABLE 3.1 Screening Factor Rating Basis

Criterion	Rating Points
EFFECTIVENESS	
Overall Protection of Human Health and the Environment	
Alternative will provide ultimate long-term mitigation of threats to public health, welfare, and the environment.	4
Alternative will mitigate threats to public health, welfare, and the environment, but long-term future threats could occur due to failure.	3
Alternative will mitigate threats to public health, welfare, and the environment, but long-term future threats are likely due to failure.	2
Alternative does not provide ultimate long-term mitigation of threats to public health, welfare, and the environment.	1
Achievement of Removal Action Objectives	
All removal action objectives can be met and no additional action is anticipated.	4
It is anticipated that all removal action objectives can be met, however, additional action may be required.	3
All removal action objectives cannot be met, and additional action may be required.	2
All removal action objectives cannot be met, and additional action will be required.	1
IMPLEMENTABILITY	
Technical Feasibility of Alternative	
Alternative is proven technically feasible in large field-scale applications under similar conditions.	4
Alternative is proven technically feasible in large field-scale applications different conditions.	3
Alternative is not proven technically feasible in large field-scale applications.	2
Alternative is not proven technically feasible, i.e. it has failed under similar conditions or is an emerging technology.	1
Schedule requirements	
It is anticipated that the alternative will meet the required schedule.	4
The alternative will not meet the required schedule.	1
Public and Regulatory/Administrative Acceptance of Alternative	
The alternative is administratively feasible and generally acceptable to the public and regulatory agencies.	4
The alternative is administratively difficult to implement but generally acceptable to the public and regulatory agencies.	3
The alternative is administratively feasible but generally unacceptable to the public and regulatory agencies.	2
The alternative may not be administratively feasible and is generally unacceptable to the public and regulatory agencies.	1
COST	
Low- Between \$0 and \$50, 000	4
Moderate – Between \$50,000 and \$200,000	3
High – Between \$200, 000 and \$500, 000	2
Unreasonable high - >\$500,000	1

Table 3.2 ANALYSIS AND SCREENING OF REMOVAL ACTION ALTERNATIVES

Criterion	Alternative 1 No Further Action	Alternative 2 Land Use Controls	Alternative 3 Construction Support	Alternative 4 Surface & Subsurface OE Clearance to Depth w/ LUCs
EFFECTIVENESS				
Overall Protection of Human Health and the Environment	1 - Provides no additional protection to human health or environment.	3 – LUCs if effectively implemented are protective but future threats could occur due to failure.	3- Only OE where construction is required will be removed. It is possible that OE exists below the surface in other areas on the site.	4 – Removal of OE will provide long-term mitigation.
Achieves Removal Action Objectives	1 - Does not allow for intended land use unless additional actions are taken.	1 – Does not allow for intended land use unless additional actions are taken.	3 – Support will be required whenever intrusive activities are performed on-site.	4 – Removal actions can be met and no additional action is anticipated.
IMPLEMENTABILITY				
Technical Feasibility	4 – It is technically feasible to take no action.	4 – It is technically feasible to implement LUCs.	4 – It is technically feasible to provide construction support.	4 – It is technically feasible to take no action.
Schedule	1 – Would not allow property to be transferred by proposed schedule.	1 – Would not allow property to be transferred by proposed schedule.	4 – Should meet schedule requirements.	4 – Should meet schedule requirements.
Acceptance and administrative feasibility	2 – Although feasible, acceptance is unfavorable because it would not allow for intended land use.	2 – Although feasible, acceptance is unfavorable because it would not allow for intended land use.	2 – This poses administrative difficulties for transfer of the property and is not generally acceptable.	4 – This is feasible and generally acceptable.
Cost	4 – No cost.	4 – Costs are extremely low for LUCs.	2 – Since construction support would be required for a much longer duration than would be required for a clearance, costs could escalate to high levels.	3 – Although costs are high as compared to LUCs alone, they are considered moderate for a clearance action.
Total	13	15	18	23

3.5 Comparative Analysis of Alternatives

3.5.1 Alternatives 1, 3, and 4 were further analyzed in greater detail. The detailed analysis consists of an assessment of individual alternatives against each of nine evaluation criteria and a comparative analysis that focuses upon relative performance of each alternative using those criteria. The purpose of the detailed comparative analysis is to assist in development of an Action Memorandum which will determine the removal action to be taken at the site.

3.5.2 Criteria Used for Evaluation. The relative significance of factors within each of nine criteria were analyzed. Evaluation criteria were as follows:

Effectiveness:

Overall protection of human health and the environment

Compliance with ARARs

Long-term effectiveness and permanence

Reduction of mobility and volume through treatment (toxicity is not applicable to an OE explosive hazard)

- Short-term effectiveness


Implementability:

- Technical feasibility
- Availability of services and materials
- Administrative feasibility

Regulatory/Community Acceptance

Cost

3.5.3 These criteria are categorized into three groups: Threshold criteria, primary balancing criteria, and modifying criteria. Overall protection of human health and the environment and compliance with ARARs (unless a specific ARAR is waived) are threshold requirements that each alternative must meet in order to be eligible for selection. Therefore, if an alternative



were to receive a score of zero for one of the threshold requirements, then the alternative would not be considered further.

The five primary balancing criteria are long-term effectiveness and permanence; reduction of mobility or volume through treatment; short-term effectiveness; implementability; and cost.

Regulatory and community acceptance are modifying criteria that are to be considered in selection of the alternative.

3.5.4 Each alternative was evaluated and compared for the following criteria: effectiveness (overall protection, ARARs, long-term effectiveness, reduction of mobility and volume, and short-term effectiveness), implementability (technical, availability, administrative, state acceptance), and cost. A single score from 0 to 3 was given for each of these sub-criteria for total possible score of 30. For those sub-criteria which were evaluated using more than one evaluation factor, evaluation factors were scored individually, and the average score was used as the overall score for that sub-criteria. The scoring basis is presented in Tables 3.3 and 3.4.




TABLE 3.3
Comparative Analysis Rating Factor Basis - Effectiveness

Criterion	Rating Points
Overall Protection of Human Health and the Environment	
Alternative will provide ultimate long-term mitigation of threats to public health, welfare, and the environment.	3
Alternative will mitigate threats to public health, welfare, and the environment, but long-term future threats could occur due to failure.	2
Alternative will mitigate threats to public health, welfare, and the environment, but long-term future threats are likely due to failure.	1
Alternative does not provide ultimate long-term mitigation of threats to public health, welfare, and the environment.	0
Compliance with ARARs and other Criteria, Advisories, and Guidance as Practicable	
Alternative will comply with ARARs, other criteria, advisories, and guidance as practicable with no further action required.	3
Some further action will be required in order to comply with ARARs, other criteria, advisories, and guidance as practicable, but it is probable that compliance will easily be achieved.	2
Extensive further action will be required in order to comply with ARARs, other criteria, advisories, and guidance as practicable, and/or achievement of compliance is uncertain.	1
Alternative does not comply with ARARs, other criteria, advisories, and guidance as practicable.	0
Long-term effectiveness	
Alternative provides permanent treatment or disposal with future risk essentially eliminated with no need for Land Use Controls	3
Alternative requires limited Land Use Controls which can be assumed to be reliable, leaving little likelihood of future risk.	2
Alternative requires extensive Land Use Controls which can be assumed to be reliable, leaving little likelihood of future risk.	1
Uncertainty of future risk or reliability of controls.	0
Reduction of Mobility or Volume	
It is anticipated that the alternative will reduce the mobility and volume completely.	3
It is anticipated that the alternative will reduce the mobility and volume to a large extent, but OE is expected to remain at undetectable levels.	2
The alternative reduces mobility but not volume.	1
Alternative provides no reduction of mobility or volume.	0
Amount of OE to be destroyed, treated or recycled.	
The alternative destroys, treats, and/or recycles all identified conventional OE.	3
The alternative destroys, treats, and/or recycles >75% of all identified conventional OE.	2
The alternative destroys, treats, and/or recycles some component all identified conventional OE.	1
Alternative does not destroy, treat, or recycle any identified OE.	0

TABLE 3.3 (Cont'd)

Comparative Analysis Rating Factor Basis - Effectiveness


Criterion	Rating Points
Short-term Effectiveness	
Short-term risks posed to the community during implementation of alternative.	
Community is at no risk of harm from implementation of the alternative.	3
Community is at minimal risk of harm from implementation of the alternative, but with safety precautions, risks are negligible.	2
Extensive precautions must be taken in order to protect the community from risk created by implementation of the alternative.	1
Community is exposed to risk from implementation of the alternative.	0
Potential impact on workers during remedial action and the effectiveness and reliability of protective measures	
Workers are at no risk from implementation of the alternative.	3
Workers are at minimal risk from implementation of the alternative, but with some precautions, risks can be considered negligible.	2
Extensive precautions must be taken in order to protect the workers from risk created by implementation of the alternative	1
Workers are exposed to risk created by implementation of the alternative.	0
Potential environmental impacts of the alternative and the effectiveness and reliability of mitigative measures during implementation	
Alternative will not have any adverse impacts on the environment.	3
Alternative may have adverse impacts on the environment, but they can be readily controlled or remedied.	2
Uncertainty as to whether alternative will have adverse impacts on the environment.	1
Alternative will have adverse impacts on the environment.	0

TABLE 3.4
Comparative Analysis Rating Factor Basis-Implementability and Cost

Criterion	Rating Points
Technical Feasibility	
Reliability of technology employed as part of the alternative.	
Alternative is proven technically feasible in large field-scale applications under similar conditions.	3
Alternative is proven technically feasible in large field-scale applications different conditions.	2
Alternative is not proven technically feasible in large field-scale applications.	1
Alternative is not proven technically feasible, i.e. it has failed under similar conditions or is an emerging technology.	0
Ease of taking additional remedial actions	
Alternative will in no way inhibit any possible future remedial actions; or no future remedial actions could possible be anticipated.	3
Alternative will not greatly hinder any future additional remedial actions which could reasonably be anticipated.	2
Alternative will make any future remedial actions which could reasonably be anticipated extremely difficult and/or expensive.	1
Alternative will preclude future remedial actions which will likely be necessary for protection of the environment or human health.	0
Availability of Services and Materials	
Availability of equipment.	
Alternative requires no special equipment which is not readily available.	3
Alternative requires special equipment which will require greater than 2 weeks but less than 3 months to be delivered or begin working at the site.	2
Alternative requires special equipment which will require greater than 3 months but less than 6 months to be delivered or begin working at the site.	1
Alternative requires special equipment which will require greater than 6 months to be delivered or begin working at the site.	0
Availability of personnel and services.	
Alternative requires no special service(s) which is not readily available.	3
Alternative requires special service(s) which will require greater than 2 weeks but less than 3 months to be delivered or begin working at the site.	2
Alternative requires special service(s) which will require greater than 3 months but less than 6 months to be delivered or begin working at the site.	1
Alternative requires special service(s) which will require greater than 6 months to be delivered or begin working at the site.	0
Administrative Feasibility	
Activities needed to coordinate with other offices and agencies and the ability and time required to obtain necessary approvals and permits from other agencies	
No involvement from agencies other than the current involvement of EPA and ADEM is necessary.	3
Special approvals or permits may be required, but no foreseen problems or lengthy time required to obtain them.	2

TABLE 3.4
Comparative Analysis Rating Factor Basis-Implementability and Cost (Cont'd.)

Criterion	Rating Points
Either uncertainty as to difficulty in obtaining special approvals or permits required, or difficulty and/or lengthy waiting period anticipated.	1
Special permits and/or approvals are necessary but can probably not be obtained, or can not be obtained in a feasible time frame.	0
Schedule requirements	
It is anticipated that the alternative will meet the required schedule.	3
The alternative will not meet the required schedule.	0
Regulatory/Community Acceptance	
Regulatory Acceptance	
Regulatory position, key concerns or comments are compatible with alternative.	3
Alternative will most likely be accepted by regulators with moderate paperwork and communication.	2
Regulators have expressed a position, key concern which might be incompatible with one or more aspects of the alternative.	1
Alternative cannot or is unlikely to receive regulatory acceptance.	0
Community Acceptance	
Community position, key concerns or comments are compatible with alternative.	3
Alternative will most likely be accepted by community with moderate paperwork and communication.	2
Community has expressed a position, key concern which might be incompatible with one or more aspects of the alternative.	1
Alternative cannot or is unlikely to receive community acceptance.	0
COST	
Low- Between \$0 and \$50, 000	3
Moderate – Between \$50,000 and \$200,000	2
High – Between \$200, 000 and \$500, 000	1
Unreasonable high - >\$500,000	0



3.5.6 Results of Comparative Analysis. Results of the comparative analysis of each alternative is located in Table 3.5, Analysis of Removal Action Alternatives. Although Alternative 1 – No Further Action did not meet the threshold criteria, it was carried through the detailed analysis for comparison to the remaining alternatives.

3.6 SUMMARY OF REMAINING ALTERNATIVES

The protective and feasible removal action alternative for the M2 Parcel after the detailed analysis is Alternative 4 – Surface & Subsurface Clearance of OE to Depth.

TABLE 3.5

ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Criterion	Alternative 1 No Further Action	Alternative 3 Construction Support	Alternative 4 Surface & Subsurface OE Clearance to Depth
EFFECTIVENESS			
Threshold Criteria			
Overall Protection of Human Health and the Environment	0 - Provides no additional protection to human health or environment.	2 - Only OE where construction is required will be removed. It is possible that OE exists below the surface in other areas on the site.	3 – Removal of OE will provide long-term mitigation.
Comply with ARARs	3 – Complies with ARARs	3 – Complies with ARARs	3 – Complies with ARARs
Primary Balancing Criteria			
Long Term Effectiveness and permanence	0 – Current controls may fail at a future date as public access to FMC increases.	1 –OE may be encountered in areas that were not cleared to support construction requiring extensive LUCs.	2 – The OE that is removed will provide a permanent remedy requiring limited LUCs.
Reduction of Mobility and Volume (Toxicity is not applicable to an OE explosive hazard)	0 – Mobility and volume are not reduced.	2.5 – Mobility and volume will only be reduced in areas where construction is performed, but all identified OE will be destroyed, treated, or recycled.	3 – It is anticipated that all OE can be removed and will be destroyed, treated and/or recycled.
Short Term Effectiveness	2.5 – Current risk to community is only to those who ignore current Land use controls.	2.3 –Community and workers are at minimal risk but with safety precautions risk is negligible.	2.3 –Community and workers are at minimal risk but with safety precautions risk is negligible.

TABLE 3.5 (Continued)

ANALYSIS AND SCREENING OF REMOVAL ACTION ALTERNATIVES

Criterion	Alternative 1 No Further Action	Alternative 3 Construction Support	Alternative 4 Surface & Subsurface OE Clearance to Depth w/LUCs
IMPLEMENTABILITY			
Primary Balancing Criteria			
Technical Feasibility	2 – It is technically feasible to take no action but would make future actions more difficult.	2 – It is technically feasible to provide construction support but would make future remedial actions more difficult.	3 – Alternative is proven technically feasible and would not inhibit future remedial actions.
Administrative Feasibility	1.5 -It is administratively feasible to take no action but would likely not receive approval for transferring the property.	1 – Uncertainty as to the difficulty in obtaining approval to transfer the property under this alternative.	2.5 – Requires special approvals but no unforeseen problems in obtaining them.
Availability of Services and Materials	3 -No services or materials are needed.	2.5 - Due to uncertainties of construction schedules, it may require longer than two weeks to mobilize personnel.	3 - Services and materials are available to meet the current schedule.
Modifying Criteria			
Regulatory/Community Acceptance	0 – Is unlikely to receive regulatory or community acceptance	1 - Expressed concerns over residual OE may be incompatible with this alternative.	2 - With effective communication, this alternative should be accepted by regulators and community.
COST			
Capital Cost	3 - \$0	1 – Due to duration of construction and uncertainties of scheduling, may easily escalate to above \$200,000.	2 - \$125,000-\$160,000
Duration	N/A	Unknown	4-6 weeks
RECOMMENDATION	15 Eliminate.	18.3 Eliminate.	25.8 Consider for implementation




SECTION 4

RECOMMENDED REMOVAL ACTION

4.1 INTRODUCTION

This section presents the recommended removal action for the M2 Parcel at FMC. Based on the risk identified in section 1.5 and the analysis of removal action alternatives, Alternative 4, Subsurface Clearance of OE to Depth with LUCs in the form of education of construction workers in the hazards associated with OE and the proper action to be taken if any suspect item is identified (i.e., notifications) is the recommended removal action.

4.2 RECOMMENDED REMOVAL ACTION



The recommended removal action for the M2 Parcel is a Subsurface Clearance of OE to Depth with Land Use Controls. This alternative satisfies the evaluation criteria because it will meet all of the removal action objectives in an acceptable amount of time, pose limited threat, is readily implementable both from a technical and administrative standpoint, and can be accomplished at a reasonable cost. This alternative was selected after evaluating all the alternatives separately under each criterion. Following the screening of the alternatives, this was the most protective and feasible alternative that would allow for the intended land use which is commercial development.

The cost estimates prepared for the removal action are based on clearance of the areas indicated in Table 3.5. Detailed estimates for surface and subsurface removal are included in Appendix E.

4.3 RESIDUAL RISK.



4.3.1 Although it is anticipated that the removal action will serve as the final remedy for this site, there are several requirements that must be met to ensure the effectiveness of the action (Table 4.1). Several detection technologies have proven that they can detect the types of potential OE suspected at the M2 Parcel at the expected depths that it is estimated they will be encountered. However, the effectiveness of the removal is not limited to the detection capability of the technology that is used but in the effectiveness of all the technologies/processes that are utilized for the removal action. Thus, it is critical that an effective Quality Assurance/ Quality Control (QA/QC) program be implemented to ensure the effectiveness of the removal action. The contractor shall outline a site-specific and technology/process QC program in the site-specific work plans that identifies the data quality objectives and how he will achieve them. This plan will be reviewed subject matter experts prior to the contractor receiving approval of his plans. The contractor will also be required to demonstrate that the technology(ies) that he has selected will achieve that data quality objectives. This will require initial data validation be performed by the contractor.

4.3.2 In addition, the Army is responsible for Quality Assurance over the removal action to ensure that the initial plans are not flawed, that the removal action is being performed in accordance with the approved plans and that it is achieving the desired results. This will be achieved through reviews by subject matter experts to ensure data quality objectives are being met; on-site monitoring to ensure approved procedures are being followed; and data validation to ensure that the removal action has been effective.

4.3.3 As part of the removal action it is recommended that Land Use Controls (LUCs) also be utilized to manage residual risk. A Land Use Control Assurance Plan or "LUCAP" is the plan assuring the effectiveness of LUCs at FMC. The LUCAP establishes a process for maintaining, inspecting, and/or enforcing LUCs at FMC. The Purpose of the LUCAP is to implement procedures to ensure the long-term effectiveness and viability of LUCs to protect human health and the environment.

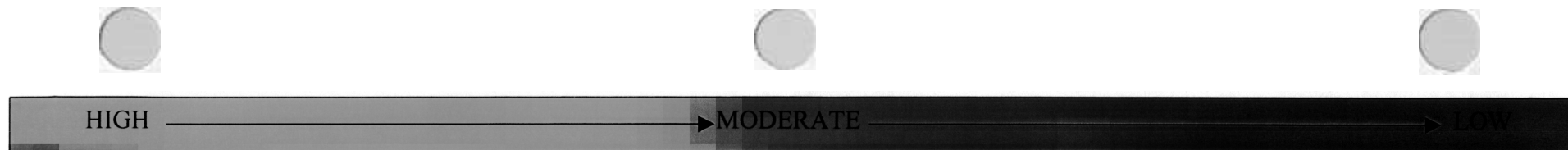
The Army may transfer or convey property in an encumbered status to ensure protection of human health and the environment, to protect the interests of the United States, and to facilitate community reuse of the surplus property. Appropriate encumbrances will be determined on a site-specific basis and may be imposed prior to the selection of a CERCLA remedy. Army policy, in accordance with basic principles of real estate law, is to transfer properties with as few encumbrances as possible.

The risks identified at the M2 Parcel can be managed effectively through implementation of a removal action combined with LUCs. In this particular case, LUCs do not prohibit unrestricted use of the property. Any residual risk can be managed through education of construction workers and notifications to property owners. The specific details of how these will be implemented will be outlined in the Land Use Control Implementation Plan.

4.3.4 The Army will also perform reoccurring reviews of the site to ensure that the removal action has been effective and that site conditions have not changed in a way that would require additional remedial action.

4.3.5 The Army is continuing its remedial and OE investigations of FMC. The Army will issue a final report following completion of all investigation activities. The Army's cleanup activities in connection with this site have been conducted consistent with the provisions of CERCLA and DERP, and do not constitute an admission of any kind by the United States. The results of the investigations described above are based on the best available information to date and should not be taken as a representation that other OE items could not be discovered at the site in the future.

4.3.6 Consistent with its obligations under CERCLA and the Defense Environmental Restoration Program (DERP), the Army remains committed to responding to the discovery of OE items associated with prior DoD activities at the M2 Parcel and will take such actions as may be necessary to address the OE items. In the event that OE items are found in the future, the individual locating the OE item should call 911 to ensure that the OE item is handled and disposed of in a safe manner.



Removal Action

**OE Clearance to depth
using proven technology**

Quality Control

**Checks to ensure
technology/ process
effectiveness to include data
validation**

Quality Assurance

**Independent data
validation/assessment
to ensure effectiveness**

Land Use Controls

LUCIP implementation

**Reoccurring
Reviews**

**Periodic reviews to
ensure controls are
implemented, and site
conditions have not
changed**

Table 4.1 Residual
Risk for M2 Parcel